

WHAT IS CLAIMED IS:

- 1 1. An apparatus, comprising a semiconductor polishing device having a first surface
2 defining at least one non-intersecting fluid retaining groove at least a portion of which is
3 oriented at an angle relative to a radial line originating at a center of the semiconductor
4 polishing device, wherein the non-intersecting fluid retaining groove is adapted to flow a
5 fluid inwardly toward a center portion of the semiconductor polishing device.
- 1 2. The apparatus of claim 1, wherein the semiconductor polishing device is one of a
2 polishing pad and a platen.
- 1 3. The apparatus of claim 1, wherein the depth of the non-intersecting fluid retaining
2 groove changes along a length of the non-intersecting fluid retaining groove.
- 1 4. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove has a
2 first portion and a second portion having a same direction of curvature and defining a
3 tangent point to the radial line.
- 1 5. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is
2 oriented in a direction of rotation moving at an increasing radius from a first end of the
3 grooves to a second end of the grooves.
- 1 6. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is
2 oriented in a direction of rotation moving at an increasing radius along a length of the non-
3 intersecting fluid retaining groove.
- 1 7. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is
2 selected from arcuate grooves, linear grooves, and any combination thereof.
- 1 8. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove
2 extends from the center portion of the semiconductor polishing device to an edge of the
3 semiconductor polishing device and wherein no point of the non-intersecting fluid retaining

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1 15. The substrate polishing pad of claim 14, wherein the one or more fluid retaining
2 grooves extend from the center portion of the substrate polishing pad to an edge of the
3 substrate polishing pad and wherein no point of the grooves is tangent to a radial line
4 extending from a center to the substrate polishing pad.

1 16. The substrate polishing pad of claim 14, wherein the grooves are formed on the
2 mounting surface and the substrate polishing pad comprises perforations extending between
3 the polishing surface and the mounting surface.

1 17. The substrate polishing pad of claim 14, wherein the substrate polishing pad
2 comprises polyurethane.

1 18. The substrate polishing pad of claim 14, wherein the substrate polishing pad is
2 adapted for use with a rotary polisher.

1 19. An apparatus for polishing a substrate, comprising:
2 (a) one or more rotatable platens;
3 (b) a motor coupled to the rotatable platens;
4 (c) one or more polishing heads rotatably mounted in facing relation to the
5 rotatable platens; and
6 (d) a polishing pad disposed on each of the rotatable platens,
7 wherein at least one of the rotatable platens and the polishing pads comprise a
8 plurality of non-intersecting fluid retaining grooves formed on a first surface thereof and
9 wherein at least a portion of the grooves are disposed at an angle to a radial line extending
10 from a center of the first surface and are adapted to flow a fluid inwardly from an outer
11 portion to a center portion of the first surface.

1 20. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining
2 grooves comprise a plurality of arcuate grooves extending from the center portion to the
3 outer portion.

1 21. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining
2 grooves are selected from the group of arcuate grooves, linear grooves and any combination
3 thereof.

1 22. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining

2 grooves is selected from the group of:

- 3 (a) arcuate grooves;
4 (b) linear grooves disposed in an angular relation to the radial line; and
5 (c) a combination of (a) and (b).

1 23. The apparatus of claim 19, wherein the first surface is a platen mounting surface of
2 the polishing pad in mating abutment with a pad mounting surface of the platen and further
3 comprising a plurality of holes formed through the polishing pad and coupling the plurality
4 of non-intersecting fluid retaining grooves with a polishing surface of the polishing pad.

1 24. The apparatus of claim 19, wherein the first surface is a pad mounting surface of the
2 platen in mating abutment with a platen mounting surface of the polishing pad and further
3 comprising a plurality of holes formed through the polishing pad and coupling the plurality
4 of non-intersecting fluid retaining grooves with a polishing surface of the polishing pad.

1 25. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining
2 grooves is selected from the group of:

- 3 (a) arcuate grooves;
4 (b) linear grooves disposed in non-parallel relation to a radial line extending
5 from a center of the polishing pad or platen; and
6 (c) a combination of (a) and (b).

1 26. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining
2 grooves comprise a first portion oriented at a first angle greater than 0 degrees and less than
3 90 degrees relative to the radial line and a second portion oriented at a second angle greater
4 than 90 degrees and less than 180 degrees relative to the radial line.

1 27. The apparatus of claim 26, wherein the first and second angles vary along their
2 respective lengths.

1 28. A rotatable platen for a polishing system, comprising a patterned pad mounting
2 surface forming a plurality of non-intersecting fluid retaining grooves each having a portion

3 oriented at an angle relative to a radial line originating at a center of the pad, the portion
4 adapted to flow a fluid inwardly from a perimeter portion to a center portion of the platen
5 during rotation of the platen.

1 29. The rotatable platen of claim 28, wherein the plurality of non-intersecting fluid
2 retaining grooves is selected from the group of:

- 3 (a) arcuate grooves;
4 (b) linear grooves disposed in angular relation to the radial line; and
5 (c) a combination of (a) and (b).

1 30. The rotatable platen of claim 28, wherein a polishing pad is mounted on the pad
2 mounting surface so that the polishing pad and the plurality of non-intersecting fluid
3 retaining grooves form fluid passageways between the polishing pad and the platen.

1 31. The rotatable platen of claim 28, wherein the rotatable platen is part of a chemical
2 mechanical polishing system.

3